

## REMARKS

The Official action mailed 7 November 2006, has been received and its contents carefully noted. The pending claims, claims 1-40, were rejected. By this amendment, claims 1-40 have been canceled and claims 41-80 have been added. Support may be found in the specification and the claims as originally filed. Specific support may be found at paragraphs 63, 78, 80-91 and 115-120 and Figures of the original specification (paragraph numbers correspond to those of the published application). No statutory new matter has been added. Therefore, reconsideration and entry of the claims as amended are respectfully requested.

### Rejections under 35 U.S.C. 102(a), 102(b) and 102(e)

The Examiner rejected the claims under 35 U.S.C. 102(a) as being anticipated by Sanders et al. (WO 02/48177). The Examiner rejected the claims under 35 U.S.C. 102(b) as being anticipated by Wiktorowicz et al. (US 6,214,191), Manz et al. (US 5,599,432), or Lee et al. (US 6,974,526).

Applicants respectfully submit that the claims, as amended, are directed towards a multidimensional electrophoresis device comprising (1) a sieving material or an ampholyte material (2) in fluidic communication with (3) a microchannel having (4) at least one photopolymerized solid gel having (5) a pore size (claim 41) and methods of using thereof. The device of the present invention may the photopolymerized solid gel (6) adjacent to the sieving material or the ampholyte material (claim 42). The sieving material or the ampholyte material may be in (7a) the same or (7b) a different microchannel as the photopolymerized solid gel (claim 43). The sieving material or the ampholyte material may be a liquid polymer gel (claim 44).

Applicants respectfully submit that prior to the present invention, the prior art does not provide a photopolymerized solid gel in a microchannel to enable multidimensional electrophoresis. The instant specification teaches how to form *in situ* (cast-in-place) solid cross-linked gels in microchannels using photopolymerization, including UV polymerization, for carrying out multidimensional electrophoresis. The ability to photopolymerize a solid gel in a microchannel enables another medium, such as an ampholyte material, a liquid polymer gel, or a

solid gel having a different pore size to be in fluidic communication or located adjacent to the photopolymerized solid gel. The ability to have two different mediums (one being the photopolymerized solid gel) in fluidic communication with each other (1) enables a wide variety of microchannel configurations such as those exemplified in Figures 4A-4E and Figure 5, and (2) enables sample stacking and (3) parallel or serial analyses using different polymers in different parts of the same chip as described in paragraph 83 and shown in Figures 7A-7D.

Applicants respectfully submit that Wiktorowicz et al., Manz et al., and Lee et al. do not teach or suggest a sieving material or an ampholyte material in fluidic communication with a photopolymerized solid gel having a pore size, wherein the sieving material may be a second solid gel having a second pore size. Nowhere do the cited art teach or suggest that the sieving material or the ampholyte material and the photopolymerized solid gel are adjacent to other. Nowhere do Wiktorowicz et al., Manz et al., and Lee et al. teach or suggest a photopolymerized solid gel *in situ* polymerized in a microchannel. In fact, Wiktorowicz et al. teaches the use of flowable media (liquid) as the sieving matrix. See col. 5, lines 9-12 and col. 6, lines 53-67. Likewise, Lee et al. only teaches the use of flowable media (gel solution) as the sieving matrix. See col. 5, lines 46-49 and col. 6, lines 53-67. Similarly, nowhere does Manz et al. teach or suggest photopolymerized solid gels in microchannels.

Since Wiktorowicz et al., Manz et al., and Lee et al. do not teach or suggest a photopolymerized solid gel in a microchannel, they do not, alone or in combination, enable the claimed invention – a multidimensional electrophoresis device comprising a sieving material or an ampholyte material in fluidic communication with a microchannel having at least one photopolymerized solid gel having a pore size where the sieving material or the ampholyte material may be a liquid polymer gel or a second solid gel having a second pore size. None of the cited art enable a sieving material or an ampholyte material adjacent to the photopolymerized solid gel where the sieving material or the ampholyte material may be a liquid polymer gel or a second solid gel having a second pore size. As the cited art do not enable the invention as claimed, the claimed invention is novel.

Therefore, Applicants respectfully assert that the claims, as amended, are novel and the rejections under 35 U.S.C. 102(a), 102(b) and 102(e) should properly be withdrawn.

### **Rejection of Polymeric Membrane (Claims 66-69)**

The Examiner also deemed that Lee et al. discloses a polymeric membrane placed on top of the microchannel.

Applicants respectfully submit that the polymeric membrane of Lee et al. is not the same as that provided in claims 66-69. Specifically, the membrane of Lee et al. must be porous as Lee et al. indicates the sample is transferred from a top channel to a bottom channel in a different plane. See col. 8, lines 1-4. The membrane of Lee et al. is not employed as a valve wherein an applied pressure will seal off the microchannel. The membrane of Lee et al. is more akin to a microfiltration membrane.

In the present invention, the membrane is employed and arranged as a valve such that it moves/deforms to seal off the bottom of channels in the same plane when pressurized. See specification paragraphs 115-120. Further, in the present invention, the polymeric membrane is not porous to the analytes as the analytes should not leak into the channels that are used to pressurize or deform the membrane to engage the valve function. Therefore, Lee et al. does not anticipate claims 66-69.

Since the membrane of Lee et al. is porous, using the membrane as a valve by deforming the membrane to attempt to seal off the microchannel will likely result in analytes leaking through the porous membrane. One skilled in the art would not be motivated to make the membrane of Lee et al. non-porous to analytes as such a modification would make the membrane unusable for its intended purpose. Thus, claims 66-69 are unobvious.

Therefore, Applicants respectfully submit that claims 66-69 are novel and unobvious and the rejection of these claims should properly be withdrawn.

### **Rejection under 35 U.S.C. 103(a)**

Under 35 U.S.C. 103(a), the Examiner rejected claims 3-7 and 28-32 (new claims 53-57 and 72-76) as being unpatentable over Sanders et al.; claims 3-7, 28-33 and 35 (new claims 53-57, 72-77 and 70) as being unpatentable over Wiktorowicz et al.; claims 3-7, 28-32, 34, 35 and 37 (new claims 53-57 and 70-76) as being unpatentable over Manz et al.; and claims 6, 7, 28-32, 35 and 36 (new claims 56, 57 and 70-76) as being unpatentable over Lee et al. The Examiner

rejected claim 12 (new claim 49) under 35 U.S.C. 103(a) as being unpatentable over Lee et al. in view of Mathies et al. (US 6,623,613). Under 35 U.S.C. 103(a) the Examiner rejected claim 13 (new claim 50) as being unpatentable over Lee et al. in view of Mathies et al. and further in view of Heller (US 6,488,832); claims 13-15 (new claims 50-52) as being unpatentable over Manz et al. in view of Heller; and claims 14 and 15 (new claims 51 and 52) as being unpatentable over Lee et al. in view of Mathies et al. and in view of Heller. The Examiner rejected claims 9-11 (new claims 47 and 48) under 35 U.S.C. 103(a) as being unpatentable over Sanders et al., Wiktorowicz et al., Manz et al. or Lee et al. in view of Woudenberg et al. (US 6,660,147) and Zhang et al. (US 6,464,850). The Examiner rejected claim 40 (new claim 80) under 35 U.S.C. 103(a) as being unpatentable over Lee et al. in view of Andersson et al. (US 6,812,456).

Applicants respectfully submit that none of the cited art, alone or in combination, alleviates the deficiencies of Wiktorowicz et al., Manz et al., and Lee et al. None of the cited art, alone or in combination, teaches or suggests the claimed invention – a multidimensional electrophoresis device comprising a sieving material or an ampholyte material in fluidic communication with a microchannel having at least one photopolymerized solid gel having a pore size where the sieving material or the ampholyte material may be a liquid polymer gel or a second solid gel having a second pore size. None of the cited art, alone or in combination, teaches or suggests a sieving material an ampholyte material adjacent to the photopolymerized solid gel where the sieving material or the ampholyte material may be a liquid polymer gel or a second solid gel having a second pore size.

Although Woudenberg et al. and Zhang et al. generally disclose UV photopolymerized gels and photoinitiators, neither Woudenberg et al. nor Zhang et al. teach or suggest a sieving material or an ampholyte material in fluidic communication with a microchannel having (or adjacent to) a photopolymerized solid gel having a pore size where the sieving material or the ampholyte material may be a liquid polymer gel or a second solid gel having a second pore size. Applicants respectfully submit that none of the other cited art, alone or in combination, alleviate the deficiencies of Wiktorowicz et al., Manz et al., Lee et al., Woudenberg et al. or Zhang et al. Specifically, nowhere do Heller, Mathies et al. or Andersson et al. teach or suggest a multidimensional electrophoresis device comprising a sieving material or an ampholyte material

in fluidic communication with a microchannel having at least one photopolymerized solid gel having a pore size where the sieving material or the ampholyte material may be a liquid polymer gel or a second solid gel having a second pore size.

Therefore, Applicants respectfully submit that the claimed invention is unobvious and the rejection under 35 U.S.C. 103(a) should properly be withdrawn.

#### **Cancellation of Original Claims 28-34**

By this amendment, claims 28-34 have been canceled and reworked as new claims 71-76 as the original claims were worded like method claims, e.g. having process limitations, which depended on device claims. Applicants are not forfeiting any device structure by canceling claims 28-34 and assert that claims 41-69 still encompass the subject matter of original claims 28-34.

#### **Request for Interview**

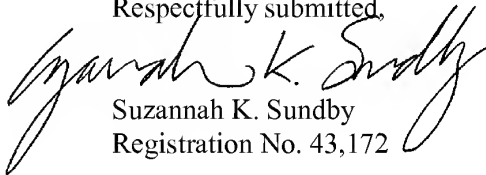
Either a telephonic or an in-person interview is respectfully requested should there be any remaining issues.

### CONCLUSION

All of the stated grounds of objection and rejection have been properly traversed, accommodated, or rendered moot. Therefore, it is respectfully requested that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Official action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

It is not believed that extensions of time are required, beyond those that may otherwise be provided for in accompanying documents. However, in the event that additional extensions of time are necessary to prevent abandonment of this application, then such extensions of time are hereby petitioned under 37 C.F.R. 1.136(a), and any fees required therefor are hereby authorized to be charged to **Deposit Account No. 02-4300**, Attorney Docket No. **034045.002 (SD 8401.1)**.

Respectfully submitted,



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